Integrated Generative Model for Industrial Anomaly Detection via Bidirectional LSTM and Attention Mechanism

Year: 2023 | Citations: 102 | Authors: Fanhui Kong, Jianqiang Li, Bin Jiang, Huihui Wang, H. Song

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Abstract

For emerging industrial Internet of Things (IIoT), intelligent anomaly detection is a key step to build smart industry. Especially, explosive time-series data pose enormous challenges to the information mining and processing for modern industry. How to identify and detect the multidimensional industrial time-series anomaly is an important issue. However, most of the existing studies fail to handle with large amounts of unlabeled data, thus generating the undesirable results. In this article, we propose a novel integrated deep generative model, which is built by generative adversarial networks based on bidirectional long short-term memory and attention mechanism (AMBi-GAN). The structure for the generator and the discriminator is the bidirectional long short-term memory with attention mechanism, which can capture time-series dependence. Reconstruction loss and generation loss test the input of sample training space and random latent space. Experimental results show that the detection performance of our proposed AMBi-GAN has the potential to improve the detection accuracy of industrial multidimensional time-series anomaly toward IIoT in the era of artificial intelligence.